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GEOMETRY.

118. Proposed by W. H. CARTER, Vice President and Professor of Mathematics, Centenary College, Jackson, La.

A picture b feet long hangs on a wall at an inclination θ to the wall, with its base a feet from the floor. How far from the wall should an admirer sit to see it to the best advantage, supposing the light to be equally distributed throughout the room?

119. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio State University, Athens, Ohio.

A sphere touches each of two straight lines which are inclined to each other at a right angle but do not meet; show that the locus of its center is an hyperbolic paraboloid.

** Solutions of these problems should be sent to B. F. Finkel not later than May 10.

CALCULUS.

88. Proposed by JOHN M. ARNOLD, Crompton, E. I.

When a watch is wound up, the mainspring is closely coiled around a cylindrical piece called the hub of the barrel-arbor. When entirely run down the spring forms an annulus against the inner circumference of the barrel. Show that if the width of the annulus is a little more than one-fourth of the radius of the barrel, the spring will run the watch the greatest number of hours at one winding, the diameter of the hub being one-third the inside diameter of the barrel.

89. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio State University, Athens, Ohio.

Integrate the equation,

$$\frac{dy}{dx} + y \cos x = \frac{\sin 2x}{2}.$$

** Solutions of these problems should be sent to J. M. Colaw not later than May 10.

MECHANICS.

87. Proposed by H. C. WHITAKER, M. E., Ph. D., Professor of Mathematics, Manual Training School, Philadelphia, Pa.

“He on his impious foes onward drove,
Drove them before him to the bounds
And crystal walls of Heaven; which opening wide
Rolled inward and a spacious gap disclosed
Into the wasteful deep; headlong themselves they threw
Down from the verge of Heaven.
Nine days they fell; Hell at last
Yawning received them whole and on them closed.”

Paradise Lost, Book VI.

Assuming Hell to be the center of the earth and the only force acting on the lost spirits to be that of gravity due to the earth's attraction,—How far is Heaven?

88. Proposed by ALOIS F. KOVARIK, Instructor in Mathematics and Physics, Decorah Institute, Decorah, Iowa.

Show that the equation to the trajectory is

$$y = x \tan \alpha - \frac{gx^2}{2v^2 \cos^2 \alpha},$$

and that v and a can be varied at pleasure, the projectile can in general be made to traverse any two given points in the same vertical plane with the point of projection. [Ex. 83, page 244, Deschanel's *Natural Philosophy*, Part I.]

*** Solutions of these problems should be sent to B. F. Finkel not later than May 10.

MISCELLANEOUS.

75. Proposed by J. C. NAGLE, Professor of Civil Engineering, Agricultural and Mechanical College, College Station, Texas.

The water tank at the Nacogdoches River on the H. E. & W. T. Ry. is filled by a 3-inch pipe from a reservoir in which the water level is 6 feet above water in tank when full. The top diameter of tank is 17 feet, the bottom diameter is 19 feet, 8 inches, and the pipe projects 10 inches through the bottom. The depth is 13 feet, 6 inches. Find the time required to fill tank, taking the pipe as clean and free from sharp bends, except the right-angled one directly under tank. This bend is 12 feet below outlet of pipe, so that the total length of pipe is 1972 feet. Compare the result with the time of filling if the inlet pipe projected over top of tank instead of entering at the bottom.

76. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio State University, Athens, Ohio.

Show that

$$\log[x-a-b\sqrt{-1}]=\frac{1}{2}\log[(x-a)^2+b^2]-\sqrt{-1}\tan^{-1}\frac{b}{x-a},$$

Naperian logarithms being used.

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EDITORIALS.

Contributors are requested to send in select problems for the Departments of Arithmetic, Mechanics, and Average and Probability.

The *Annals of Mathematics*, published for the past fifteen years at the University of Virginia, is to be transferred to Harvard University with the close of the present volume.

Mathematics and the mathematical world have sustained a great loss in the death of Prof. Sophus Lie, which occurred at Christiania, Monday, February 18. He was Professor of Geometry at the University of Leipzig from 1886 to 1898, and at the time of his death was Professor of Mathematics at the University of Christiania. We hope to be able to give a biographical sketch of Professor Lie in a future issue of the MONTHLY.

Cornell University announces a Course of Instruction during the Summer, session to be held July 5 to August 16. The following courses in Advanced Mathematics are offered: Advanced Integral Calculus, Prof. Wait; Differential Equations, Dr. Murray; Projective Geometry, Prof. Wait; Theory of Functions of a Complex Variable, Dr. G. A. Miller; Theory of Groups of a Finite Order, Dr. G. A. Miller; Theory of Numbers, Dr. G. A. Miller.